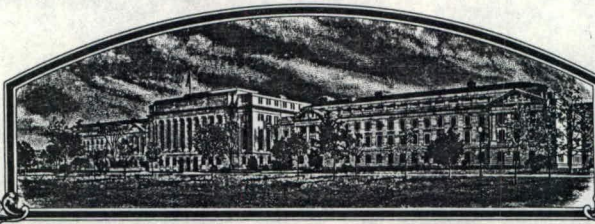


No.

8400011



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Minnesota Agricultural Experiment Station

**Whereas, THERE HAS BEEN PRESENTED TO THE
Secretary of Agriculture**

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT.

UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

BARLEY

'Robust'

*In Testimony Whereof, I have hereunto set
my hand and caused the seal of the Plant
Variety Protection Office to be affixed
at the City of Washington
this 29th day of March in
the year of our Lord one thousand nine
hundred and eighty-five.*

Attest:

Harriet A. Evans
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

John R. Block
Secretary of Agriculture

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, MEAT, GRAIN & SEED DIVISION

FORM APPROVED: OMB NO. 0581-0055

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

1. NAME OF APPLICANT(S) Minnesota Agricultural Experiment Station		2. TEMPORARY DESIGNATION Minn. M36		3. VARIETY NAME Robust	
4. ADDRESS (Street and No. or R.F.D. No., City, State, and Zip Code) Univ. of MN, 220 Coffey Hall 1420 Eckles Ave., St. Paul, MN 55108		5. PHONE (Include area code) (612) 373-0751		FOR OFFICIAL USE ONLY PVPO NUMBER 8400011	
6. GENUS AND SPECIES NAME Hordeum vulgare L.		7. FAMILY NAME (Botanical) Graminae		FILING DATE 11/1/83 TIME 2:30 <input type="checkbox"/> A.M. <input checked="" type="checkbox"/> P.M.	
8. KIND NAME Barley, six-rowed		9. DATE OF DETERMINATION Feb. 15, 1983		FEE RECEIVED AMOUNT FOR FILING \$ 1,000 DATE 11/1/83 AMOUNT FOR CERTIFICATE \$ 500.00 DATE 3-28-85	
10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION (Corporation, partnership, association, etc.)					
11. IF INCORPORATED, GIVE STATE OF INCORPORATION				12. DATE OF INCORPORATION	
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS Donald C. Rasmusson Department of Agronomy and Plant Genetics University of Minnesota St. Paul, MN 55108					
14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED					
a. <input checked="" type="checkbox"/> Exhibit A, Origin and Breeding History of the Variety (See Section 52 of the Plant Variety Protection Act.) b. <input checked="" type="checkbox"/> Exhibit B, Novelty Statement c. <input checked="" type="checkbox"/> Exhibit C, Objective Description of the Variety (Request form from Plant Variety Protection Office.) d. <input checked="" type="checkbox"/> Exhibit D, Additional Description of the Variety					
15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act.) <input checked="" type="checkbox"/> Yes (If "Yes," answer items 16 and 17 below) <input type="checkbox"/> No					
16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED? <input checked="" type="checkbox"/> Foundation <input checked="" type="checkbox"/> Registered <input checked="" type="checkbox"/> Certified		
18. DID THE APPLICANT(S) FILE FOR PROTECTION OF THE VARIETY IN THE U.S.? <input type="checkbox"/> Yes (If "Yes," give date) <input checked="" type="checkbox"/> No					
19. HAS THE VARIETY BEEN OFFERED FOR SALE OR MARKETING IN THE U.S. OR OTHER COUNTRIES? The variety has been released and is being marketed in the U.S. 1983 and 1984. <input checked="" type="checkbox"/> Yes (If "Yes," give names of countries and dates) <input type="checkbox"/> No					
20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable. The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act. Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.					
SIGNATURE OF APPLICANT Donald C Rasmusson				DATE Feb. 27, 1984	
SIGNATURE OF APPLICANT				DATE	

INSTRUCTIONS

General: Send an original copy of the application and exhibits, at least 2,500 viable seeds, and \$1,000 fee (*\$500 filing fee and \$500 examination fee*) to U.S. Department of Agriculture, Agricultural Marketing Service, Livestock, Meat, Grain and Seed Division, Plant Variety Protection Office, National Agricultural Library Building, Beltsville, Maryland 20705. (*See section 180.175 of the Regulations and Rules of Practice.*) Retain one copy for your files. All items on the face of the form are self-explanatory unless noted below.

Item

- 9 Give the date the applicant determined that he had a new variety based on (1) the definition in section 41(a) of the Act and (2) the date a decision was made to increase the seed.
- 14a Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method; (2) the details of subsequent stages of selection and multiplication; (3) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified and (4) evidence of uniformity and stability.
- 14b Give a summary statement of the variety's novelty. Clearly state how this novel variety may be distinguished from all other varieties in the same crop. If the new variety most closely resembles one or a group of related varieties: (1) identify these varieties and state all differences objectively; (2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and (3) submit, if helpful, seed and plant specimens or photographs of seed and plant comparisons clearly indicating novelty.
- 14c Fill in the Exhibit C, Objective Description form, for all characteristics for which you have adequate data.
- 14d Describe any additional characteristics that are not described, or whose description cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the description of characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, etc.
- 15 If "Yes" is specified (*seed of this variety be sold by variety name only as a class of certified seed*) the applicant may NOT reverse his affirmative decision after the variety has either been sold and so labeled, his decision published, or the certificate has been issued. However, if the applicant specified "No," he may change his choice. (*See section 180.16 of the Regulations and Rules of Practice.*)
- 16 See section 42 of the Plant Variety Protection Act and section 180.7 of the Regulations and Rules of Practice.

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14A. Exhibit A, Origin and Breeding History of the Variety:

Robust originated from the cross 'Morex'/'Manker' made in 1973. The F₂ generation was grown in the field and individual plants were selected. The F₃ and F₄ generations were grown in the greenhouse using a single seed descent procedure. The F₅ generation was grown in the field and selection was practiced for agronomic and malting quality traits. Robust traces to a single plant that was taken at random from a selected F₅ line. Seed of the single plant was increased in a winter nursery in Mexico and replicated testing was begun in the F₇ generation in 1976. Testing for disease and agronomic merit in statewide trials continued through 1982 and in a regional trial in 1979 through 1982. Malting and brewing quality was evaluated at the USDA Barley and Malt Laboratory, Madison, Wisconsin and in industry pilot and plant scale tests starting in 1975 (F₅ generation) and continuing through 1982. Reselection was done in 1979 (F₁₀ generation) when 45 head rows were bulked to reconstitute the line. Robust contains no off-type plants.

14B. Exhibit B, Novelty Statement:

Robust is a six-rowed, smooth-awned spring barley. The kernels are covered, medium size, with short rachilla hairs, and a white aleurone. The spike is medium-lax, medium-large, and semi-erect. It is medium late, mid-tall and has moderately strong straw.

Robust is intermediate to its parents, 'Morex' and 'Manker', in plant characters such as leaf size, head number and kernel number. It is, however, two to three days later in maturity than either parent. It is resistant to races of stem rust and spot blotch which occur in Minnesota. It is susceptible to prevalent races of loose smut.

Robust is different from all other midwestern malting barleys with which it might be compared. Of the midwestern barleys it is most similar to Morex, one of its parents. However, Robust is different from Morex in being 2 days later maturing, more resistant to lodging, higher yielding and in having a higher percentage of plump kernels (Table 1).

14D. Exhibit D, Additional Description of Robust

'Robust' barley (Hordeum vulgare L.) (Reg. No. 184), P.I. 476976, was developed by the Minnesota Agricultural Experiment Station and released 15 Feb. 1983. Robust originated from a single F₅ plant selected from a 'Morex'/'Manker' cross made in 1973, and was tested as M36.

The breeding procedure was a combination of pedigree selection and single seed descent. Robust has been tested in all of the north central states and some testing has been done in the northwestern states. The proposed area for growing is the north central barley growing states. It may be suitable for growing in the western states, but this is not determined.

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14D. (cont)

Robust is a six-rowed, smooth-awned spring barley. The kernels are covered and medium-large, with a short haired rachilla and white aleurone. The spike is medium-lax, medium-long, and semi-erect. Robust is medium-late, midtall, and has moderately strong straw.

Seed stocks will be maintained by the Minnesota Agricultural Experiment Station and the Minnesota Crop Improvement Association. Certification will be limited to three generations after breeder seed: Foundation, Registered and Certified. Certified seed will be offered for sale in 1983. Application will be made for protection via the "Certification Option".

14A. Exhibit A, addendum:

Robust is stable and can be maintained and reproduced by seed through a number of generations without changing its characteristics.

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Table 1. Agronomic performance of Robust compared to Morex in Minnesota, 1979-83.

	No. of station years	Morex	Robust
Yield, bu/a	27	74	79
Plump barley, %	19	67	80
Lodging, %	19	36	28
Heading date, June	19	17	19



Item 14D: (cont)

GALLEY1

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CROP SCIENCE, VOL. 23, SEPTEMBER-OCTOBER 1983

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REGISTRATION OF CROP CULTIVARS

13

14

ROBUST BARLEY

15 'ROBUST' barley (*Hordeum vulgare* L.) (Reg. No. 184), P.I.
 16 476976, was developed by the Minnesota Agricultural Ex-
 17 periment Station and released 15 Feb. 1983. Robust origi-
 18 nated from a single F₅ plant selected from a 'Morex'/
 19 'Manker' cross made in 1973, and was tested as M36. Ro-
 20 bust is a six-rowed, smooth-awned spring barley. The ker-
 21 nels are covered and medium-large, with a short haired
 22 rachilla and white aleurone. The spike is medium-lax, me-
 23 dium-long, and semierect. Robust is medium-late, midtail,
 24 and has moderately strong straw. Although relatively widely
 25 adapted, it is probably best suited for the barley growing
 26 area of the upper midwest.

27 Robust is superior to Morex, the most widely grown cul-
 28 tivar in Minnesota(1), in grain yield, kernel plumpness, and
 29 lodging resistance. Robust has exceeded Morex for grain
 30 yield by 7% in 28 trials in Minnesota and by 10% in 49
 31 regional trials. It is 2 to 3 days later in maturity than Morex.
 32 Robust has high levels of resistance to stem rust, incited
 33 by *Puccinia graminis* Pers. f. sp. *tritici* Pers., and spot blotch,
 34 incited by *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoemaker,
 35 but is susceptible to loose smut, caused by *Ustilago nuda*
 36 (Jens.) Rostr.

37 In regional tests conducted in collaboration with the
 38 USDA Barley and Malt Lab., Madison, Wi., Robust ap-
 39 peared equal to Morex in most quality traits. It has the
 40 high extract level of Morex. It is lower than Morex in alpha
 41 amylase and diastase power but higher in plump kernel per-
 42 centage. In pilot tests and in one plant scale test made in
 43 cooperation with the malting and brewing industries, Ro-
 44 bust was rated satisfactory and equal to the check for malt-
 45 ing and brewing characteristics. Breeder seed is maintained
 46 by the Minnesota Agric. Expt. Stn., St. Paul, MN 55108.

47
 48 D. C. RASMUSSEN AND R. W. WILCOXSON

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References and Notes

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1. Rasmussen, D.C., and R.D. Wilcoxson 1979. Registration of Morex bar-
ley. Crop Sci. 19:293.
2. Professors, Dep. of Agronomy and Plant Genetics and Dep. of Plant
Pathology, respectively, Univ. of Minnesota, St. Paul, MN 55108. Pub-
lished with the approval of the Director of the Minnesota Agric. Exp.
Stn. as Journal Article No. 13, 371. Accepted 19 May 1983.

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...with the identity of the ...
...the ...



UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, POULTRY, GRAIN & SEED DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Barley)

OBJECTIVE DESCRIPTION OF VARIETY
BARLEY (*HORDEUM VULGARE*)

INSTRUCTIONS: See Reverse.

NAME OF APPLICANT(S)

Minnesota Agricultural Experiment Station

ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code)

University of Minnesota

St. Paul, MN 55108

FOR OFFICIAL USE ONLY

PVPO NUMBER

8400011

VARIETY NAME OR TEMPORARY DESIGNATION

Place the appropriate number that describes the varietal character of this variety in the boxes below.

Place a zero in first box (i.e. or) when number is either 99 or less or 9 or less.

1. GROWTH HABIT:

1 = SPRING 2 = FACULTATIVE WINTER 3 = WINTER Early Growth: 1 = PROSTRATE 2 = SEMIPROSTRATE
3 = ERECT

2. MATURITY (50% Flowering):

1 = EARLY (California Mariout) 2 = MIDSEASON (Betzes) 3 = LATE (Frontier)

No. of days Earlier than } 1 = BETZES 2 = CALIFORNIA MARIOUT 3 = CONQUEST 4 = DICKSON
 No. of days Later than } 5 = PIROLINE 6 = PRIMUS 7 = UNITAN

3. PLANT HEIGHT (From soil level to top of head):

1 = SEMIDWARF 2 = SHORT (California Mariout) 3 = MEDIUM TALL (Betzes) 4 = TALL (Conquest)

Cm. Shorter than } 1 = BETZES 2 = CALIFORNIA MARIOUT 3 = CONQUEST 4 = DICKSON
 Cm. Taller than } 5 = PIROLINE 6 = PRIMUS 7 = UNITAN

4. STEM:

Exertion (Flag to spike at maturity): 1 = 0 - 3 cm. 2 = 3 - 10 cm. Anthocyanin: 1 = ABSENT 2 = PRESENT
3 = 10 - 15 cm.

NO. OF NODES (Originating from node above ground)

Collar Shape: 1 = CLOSED 2 = V-SHAPED 3 = OPEN Shape of Neck: 1 = STRAIGHT 2 = SNAKY
4 = MODIFIED CLOSED OR OPEN 3 = OTHER (Specify) _____

5. LEAF:

Basal leaf sheath (seedling): 1 = GLABROUS 2 = PUBESCENT Position of flag leaf (at boot stage): 1 = DROOPING
2 = UPRIGHT

Waxiness: 1 = ABSENT (Glossy) 2 = SLIGHTLY WAXY MM. WIDTH (First leaf below flag leaf)
3 = WAXY

CM. LENGTH (First leaf below flag leaf) Anthocyanin in leaf sheath: 1 = ABSENT 2 = PRESENT

6. HEAD:

Type: 1 = TWO-ROWED 2 = SIX-ROWED Density: 1 = LAX 2 = ERECT (Not dense)
3 = ERECT (Dense)

Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE Waxiness: 1 = ABSENT (Glossy) 2 = SLIGHTLY WAXY
4 = OTHER (Specify) _____ 3 = WAXY

Lateral Kernels Overlap: 1 = NONE 2 = AT TIP Rachis (Hair on edge): 1 = LACKING 2 = FEW 3 = COVERED
3 = 1/4 - 1/2 OF HEAD

7. GLUME:

Length: 1 = 1/3 OF LEMMA 2 = 1/2 OF LEMMA Hairs: 1 = NONE 2 = SHORT 3 = LONG
3 = MORE THAN 1/2 OF LEMMA

Hair covering: 1 = NONE 2 = RESTRICTED TO MIDDLE 3 = CONFINED TO BAND 4 = COMPLETELY COVERED

Awns: 1 = LESS THAN EQUAL TO LENGTH OF GLUMES 2 = EQUAL TO LENGTH OF GLUMES
3 = MORE THAN EQUAL TO LENGTH OF GLUMES

Awn Surface: 1 = SMOOTH 2 = SEMISMOOTH 3 = ROUGH

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8. LEMMA:

5 Awn: 1 = AWNLESS 2 = AWNLETS ON CENTRAL ROWS, AWNLESS ON LATERAL ROWS
3 = SHORT ON CENTRAL ROWS, AWNLETS ON LATERAL ROWS 4 = SHORT (less than equal to length of spike)
5 = LONG (longer than spike) 6 = HOODED

2 Awn Surface: 0 = AWNLESS 1 = SMOOTH 2 = SEMISMOOTH 3 = ROUGH

2 Teeth: 1 = ABSENT 2 = FEW 3 = NUMEROUS 1 Hair: 1 = ABSENT 2 = PRESENT

3 Shape of base: 1 = DEPRESSION 2 = SLIGHT CREASE 1 Rachilla Hairs: 1 = SHORT 2 = LONG
3 = TRANSVERSE CREASE

9. STIGMA:

1 Hairs: 1 = FEW 2 = MANY

10. SEED:

2 Type: 1 = NAKED 2 = COVERED 1 Hairs on Ventral Furrow: 1 = ABSENT 2 = PRESENT

3 Length: 1 = SHORT (8.0 mm.) 2 = SHORT TO MIDLONG (7.5 - 9.0 mm.) 3 = MIDLONG (8.5 - 9.5 mm.)
4 = MIDLONG TO LONG (9.0 - 10.5 mm.) 5 = LONG (10.0 mm.)

2 Wrinkling of hull: 1 = NAKED 2 = SLIGHTLY WRINKLED 3 = SEMIWRINKLED 4 = WRINKLED

1 Aleurone Color: 1 = COLORLESS (White or Yellow) 2 = BLUE

0 0 PERCENT ABORTIVE 3 5 GMS. PER 1000 SEEDS

11. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

0 SEPTORIA 0 NET BLOTCH 2 SPOT BLOTCH 1 POWDERY MILDEW

1 LOOSE SMUT 0 BACTERIAL BLIGHT 0 COVERED SMUT 0 FALSE LOOSE SMUT

2 STEM RUST 0 LEAF RUST 0 SCAB 0 SCALD

0 AY 0 BSMV 0 BYDV 0 OTHER (Specify)

12. INSECT: (0 = Not tested, 1 = Susceptible, 2 = Resistant)

0 GREEN BUG 0 ENGLISH GRAIN APHID 0 CHINCH BUG 0 ARMYWORM

0 GRASS HOPPERS 0 CERIAL LEAF BETTLE 0 OTHER (Specify)

HESSIAN FLY RACES } 0 GP 0 A 0 B 0 C
0 D 0 E 0 F 0 G

13. CHEMICAL (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

0 DDT 0 OTHER (Specify)

14. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	MOREX	Seed size	LARKER
Leaf size	MANKER	Coleoptile elongation	
Leaf color	MOREX	Seedling pigmentation	
Leaf carriage	MOREX		

REFERENCES: The following publications may be used as a reference aid for the standardization of character descriptions and terms used in this form:

1. Wiebe, G. A., and D. A. Reid, 1961, Classification of Barley Varieties Grown in the United States and Canada in 1958, Technical Bulletin No. 1224, U.S. Dept. of Agriculture.
2. Reid, D. A., and G. A. Wiebe, 1968, Barley: Origin, Botany, Culture, Winter Hardiness, Genetics, Utilization, Pests, Agriculture Handbook No. 338, U.S. Dept. of Agriculture. pp. 61 - 84.
3. Malting Barley Improvement Association, Milwaukee, Wisconsin, 1971, Barley Variety Dictionary.

COLOR: Nickerson's or any recognized color fan may be used to determine color of the described variety.